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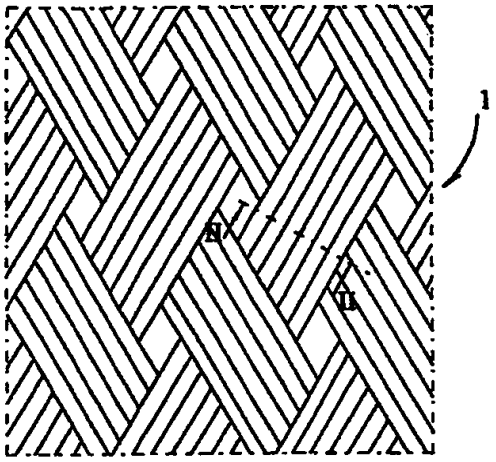
(54) Flexible insulating hose

(57) It includes first yarns (2) of plastic material having a diameter of between about 0.5 and 0.7 mm, second braided yarns (3) of bulky material and third yarns (4) having multiple filaments, the ratio between these yarns being any comprised between 1-4-1 and 1-6-3.

The invention achieves a great elasticity in the hose and a better sound absorption than in the known insulating hoses.

FIG. 1



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Description

The present invention relates to a flexible insulating hose comprising at least first yarns and second braided yarns, the first yarns being of plastic material and the second yarns of bulky material.

Insulating hoses of this type are used for covering automobile cables in order to absorb the sound which they can produce when they knock against the bodywork of the vehicle when the latter is running.

BACKGROUND OF THE INVENTION

As they are subject to vibrations, automobiles produce noises which are annoying to the occupants of the vehicle. Amongst such noises are those produced by the cables when they knock against the vehicle bodywork due to vibrations.

Known in the art are various insulating hoses for covering automobile cables and absorbing the noise which they produce.

These hoses are usually made by braiding yarns of plastic material, which have the advantage of being very flexible and adapting to different cable diameters. The disadvantage of this type of hoses is that sound absorption is low due to the characteristics of the materials used.

Also known are insulating hoses made up of yarns of bulky material, which have the disadvantage that they have neither the right consistency or elasticity for use, although sound absorption is greater than most hoses with yarns of plastic material.

A combination of these two types of hoses, with yarns of plastic material and yarns of bulky material was disclosed by patent PCT/GB90/00761, which describes a textile sleeving for enclosing cables, wires or the like, which includes a monofilament yarn of plastic material with a diameter of 0.18 to 0.3 mm and a yarn of bulky material, the ratio between the number of yarns of plastic material and the number of yarns of bulky material being between 1 to 1 and 3 to 1.

This sleeving has the disadvantage that its elasticity is limited due to the number and diameter of the yarns of plastic material.

Moreover, sound absorption is limited due to its having a number of yarns of bulky material (which is the material which absorbs noise) equal to or lower than the number of yarns of plastic material.

DESCRIPTION OF THE INVENTION

The hose of the invention provides a solution for the aforementioned disadvantages, while at the same time presenting other advantages which will be described.

The flexible insulating hose of the invention is of the type which includes at least first yarns and second yarns braided together, said first yarns being of plastic material and said second yarns being of bulky material, and is characterized in that the first yarns of plastic material have a diameter of between 0.5 and 0.7 mm approximately, the ratio between the first and second yarns being between 1 to 4 and 1 to 6.

Thanks to the diameter of the yarn of plastic material the hose has great elasticity, recovering its original length almost totally after being subject to traction, as can be seen from the tests carried out and described hereinafter in this specification.

Furthermore, the ratio between the first and second yarns allows sound absorption to be higher than in the known insulating hoses.

Advantageously, the hose of the invention also includes third yarns of multiple filaments, which increase still further the tensile strength of the hose of the invention.

Preferably, the ratio between the number of first and third yarns is between 1 to 1 and 1 to 3.

In one embodiment, the material of the third yarns is polyester.

Advantageously, the tensile strength of the first yarns of plastic material is between 70 and 100 N approximately.

Also advantageously, the tensile strength of the second yarns of bulky material is between 10 and 20 N approximately.

Also advantageously, the tensile strength of the third yarns made up of multiple filaments is between 35 and 60 N approximately.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of all that is outlined some drawings are attached which, schematically and by way of non-restrictive example, show several embodiments of the hose of the invention, together with the results obtained with the method of the invention.

Figure 1 is a front view of a portion of the insulating hose;

Figure 2 is a section view along line II-II of Figure 1 of the yarns which constitute the insulating hose.

DESCRIPTION OF A PREFERRED EMBODIMENT AND RESULT OF TESTS CARRIED OUT

The figures show that the hose 1 includes three different types of yarns braided together.

The first yarns 2 are monofilament yarns of plastic material with a diameter of between 0.5 and 0.7 mm approximately. For each first yarn 2 of plastic material there are four second yarns 3 of bulky material and a third yarn 4 made of multiple polyester filaments.

The ratio between the number of first monofilament yarns 2, the number of second bulky yarns 3 and the number of third multifilament yarns 4 can be any between 1-4-1 and 1-6-3.

This range of ratios endows the hose with greater elasticity, so that it recovers its original length almost entirely after being subjected to traction. Sound absorption is also greater than with known insulating hoses.

Several tests are now described, carried out with ten samples of the hose of the invention, Periflex Pep-0 (anti-sound) model, size 14, colour white, using the following apparatus:

- Heraeus forced-ventilation oven.
- Instron 1011 dynamometer.
- Combustion chamber manufactured by Relats, S.A. in accordance with standard ISO 3795.

a) Flame resistance test (according to ME PSA D 45-1333, edition of 15.3.93):

After ten samples the flame goes out immediately when the flame is removed from the sample (type A non-combustible).

b) Thermal ageing test:

After submitting the hose to 150°C for 140 hours it turned slightly brown.

c) Tensile strength and fracture elongation:

The following table sets out the results obtained with ten samples of the hose of the invention in its initial state:

Sample	Monofilament yarn		Bulky yarn		Multifilament yarn	
	Tensile strength (N)	Fracture elongation (%)	Tensile strength (N)	Fracture elongation (%)	Tensile strength (N)	Fracture elongation (%)
1	84.77	35.15	15.43	37.85	49.49	13.01
2	85.12	36.12	16.29	38.45	47.79	12.64
3	80.85	35.29	14.56	36.89	47.98	12.64
4	83.45	37.14	17.24	37.42	49.06	12.87
5	86.13	33.87	13.47	37.09	48.23	12.76
6	82.12	36.28	15.29	35.73	47.12	12.54
7	89.67	31.45	15.87	38.91	48.34	12.69
8	80.69	33.75	16.08	37.56	48.93	12.88
9	81.98	35.29	14.54	38.06	47.54	12.47
10	84.56	34.86	15.02	37.72	47.77	12.63
Average	84.77	34.92	15.38	37.57	48.23	12.71

The next table sets out the references and the results obtained with ten samples of the hose of the invention after 240 hours submitted to a temperature of 150°C.

Sample	Monofilament yarn		Bulky yarn		Multifilament yarn	
	Tensile strength (N)	Fracture elongation (%)	Tensile strength (N)	Fracture elongation (%)	Tensile strength (N)	Fracture elongation (%)
1	73.84	24.95	7.12	5.07	49.41	14.91
2	76.83	24.08	7.26	5.21	59.93	17.78
3	70.29	25.91	6.07	3.87	63.01	18.41
4	75.13	24.73	6.78	4.23	64.83	19.72
5	74.22	24.45	7.67	5.78	55.21	16.18
6	73.98	24.98	7.22	5.18	57.19	17.15
7	76.52	24.02	6.98	4.39	48.77	14.68
8	75.78	24.13	6.54	4.08	49.67	15.74
9	76.12	24.07	7.56	5.57	49.12	15.35
10	74.77	24.23	7.03	4.99	61.13	18.29
Average	74.75	24.55	7.02	4.84	55.83	16.82

As can be observed, the hose of the invention underwent no fundamental changes.

d) Contraction following ageing:

The table below sets out the results obtained with five samples of the hose of the invention after submitting it to a temperature of 150°C for 240 hours:

Sample	Initial length (mm)	Length after contraction (mm)	% recovery
1	200	198.0	1.00
2	200	197.5	1.25
3	200	197.0	1.50
4	200	197.5	1.25
5	200	199.0	0.50
Average	200	197.8	1.10

The test for calculating recovery of the hose is carried out with the following polyester yarns:

- 16 monofilament yarns of 0.5 mm diameter.
- 64 bulky multifilament yarns of 1340 denier.
- 16 multifilament yarns of 1100 denier.

The original diameter of the hose at rest was 10 mm and its original length at rest was 149 mm.

The following results were obtained by placing the hose in a mandrel:

Mandrel Ø	Degree of exposure	Forced length (mm)	Hose Ø without mandrel (mm)	Hose length without mandrel (mm)
20 mm	100%	95 (-36%)	10.5 (+5%)	141 (-5.4%)
21 mm	110%	91 (-39%)	11.0 (+10%)	139 (-6.7%)
23 mm	130%	70 (-53%)	12.5 (+25%)	135 (-9.4%)

As can be observed, the hose of the invention did not undergo substantial changes.

Claims

1. A flexible insulating hose (1), including at least first yarns (2) and second yarns (3) braided together, the first yarns (2) being of plastic material and the second yarns (3) of bulky material, characterized in that the first yarns (2) of plastic material have a diameter comprised between about 0.5 and 0.7 mm, the ratio between the number of first yarns (2) and the number of second yarns (3) forming the hose being between 1 to 4 and 1 to 6.

2. A hose, as claimed in Claim 1, characterized in that it also includes third yarns (4) of multiple filaments.

3. A hose, as claimed in Claims 1 and 2, characterized in that the ratio between the number of first yarns (2) and the number of third yarns (4) is between 1 to 1 and 1 to 3.

4. A hose, as claimed in Claims 2 or 3, characterized in that the material of the third yarns (4) is polyester.

5. A hose, as claimed in Claim 1, characterized in that the tensile strength of the first yarns (2) of plastic material is between 70 and 100 N approximately.

6. A hose, as claimed in Claim 1, characterized in that the tensile strength of the second yarns (3) of bulky material is between 10 and 20 N approximately.

7. A hose, as claimed in Claim 2, characterized in that the tensile strength of the third yarns (4) made up of multiple filaments is between 35 and 60 N approximately.

FIG. 1

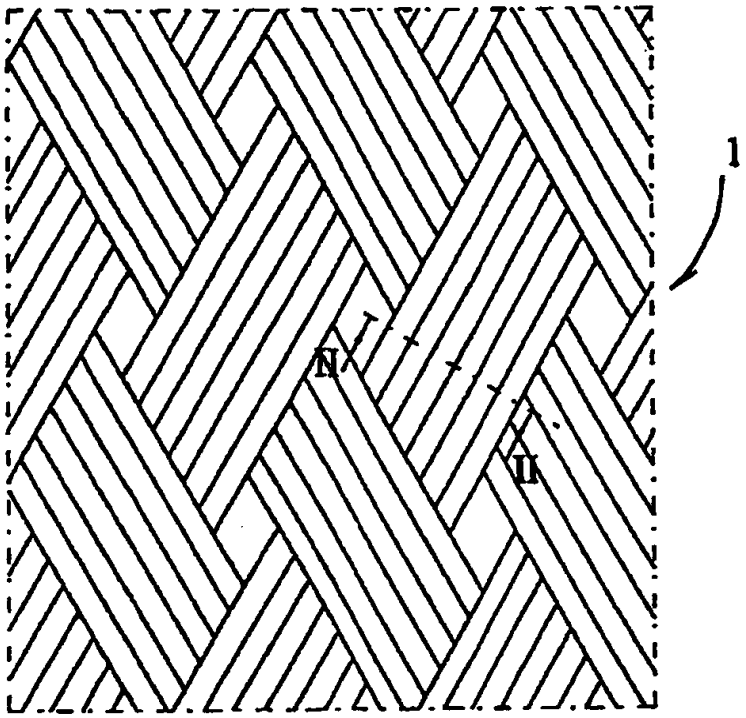

FIG. 2